CLAIMS

1. A method of training a biological neural network using a controller, comprising:

applying a cycle comprising:

stimulating a neural network by said controller applying at least an input signal to the network;

detecting an output response of the network by said controller; and

modifying said stimulation by said controller for at least a period of time if said response matches a desired at least approximate response; and

repeating said cycle of stimulation, detection and modification at least one more time until said neural network is trained to generate a desired output response for said input signal.

2. A method according to claim 1, wherein said input signal is a localized signal and wherein stimulating comprises applying a less localized stimulation.

3. A method according to claim 2, wherein said modifying comprises reducing said less localized stimulation.

4. A method according to claim 2, wherein said modifying comprises increasing said less localized stimulation.

5. A method according to claim 1, wherein said input signal is a specific signal and wherein stimulating comprises applying a less specific stimulation.

6. A method according to claim 1, wherein said modifying comprises modifying said input signal.

7. A method according to claim 1, wherein said modifying comprises stopping said stimulation.

8. A method according to claim 1, wherein said modifying is applied in a manner known to affect a stability of connections in said network.

9. A method according to claim 1, wherein said modifying is applied in a manner known to affect a learning behavior of said neurons of said network.

10. A method according to claim 1, wherein said stimulating comprises stimulating using a magnetic field stimulator.

11. A method according to claim 1, wherein said stimulating comprises stimulating using an electric current.

12. A method according to claim 1, wherein said modifying comprises applying a chemical agent.

13. A method according to claim 1, wherein said modifying comprises applying an electric field.

14. A method according to claim 1, comprising modifying said method by said controller in response to a response of said network to said method.

15. A method according to claim 1, wherein said desired output response is a particular defined response.

16. A method according to claim 1, wherein said desired output response is a random response pattern indicative of an unlearning by said network.

17. A method according to claim 1, wherein said desired output response is a spatial shift in a portion of said network that responses to said input, from a previous responding portion to a shifted responding portion.

18. A method according to claim 1, comprising changing said input pattern during a repetition cycle.

19. A method according to claim 1, comprising increasing a resolution of said input pattern between repetition cycles.

20. A method according to claim 1, comprising requiring an output response with a reduced range of acceptable values in subsequent repetition cycles.

21. A method according to claim 1, wherein repeating comprises repeating until an area of said network is organized to act as an input interface for said network for direct setting of network values not via a network's standard inputs.

22. A method according to claim 1, wherein repeating comprises repeating until an area of said network is organized to act as an output interface for said network for direct receiving of network values not via a network's standard outputs.

23. A method according to claim 1, comprising:

providing a complex output response pattern to inputs to be trained into said network;

dividing said response pattern into sub-patterns;

training said sub-patterns individually; and

linking said sub-patterns.

24. A method according to claim 1, comprising training a desired output response pattern to inputs as a whole into said network.

25. A method according to claim 1, wherein said network is an in-vitro network.

26. A method according to claim 25, wherein said network is grown in a container.

27. A method according to claim 25, wherein said network is excised from a living body to a container.

28. A method according to claim 25, comprising:

providing a potential environmental contaminant;

repeating said method under at least two conditions of said contaminant; and

comparing a response of said network to said method to determine an effect of said contaminant on training of said network.

29. A method according to claim 1, wherein said network is an in-vivo network in a living non-human animal.

30. A method according to claim 29, comprising:

providing a potential environmental contaminant;

repeating said method under at least two conditions of said contaminant; and

comparing a response of said network to said method to determine an effect of said contaminant on training of said animal.

31. A method according to claim 29, comprising:

selecting a network portion of said animal that is coupled to a sensing ability of said animal; and

training said network portion to output at least an indication of a sensing by said animal.

32. A method according to claim 29, wherein said input is a command that can be sensed by said animal and wherein said desired output is a behavioral response of said animal.

33. A method according to claim 32, wherein said input and said output are inter-related using a complex logic, including at least two logic steps.

34. A method according to claim 1, wherein said network is an in-vivo network in a living human.

35. A method according to claim 34, wherein said network is a GI motor complex.

36. A method according to claim 34, wherein said network is a nervous plexus.

37. A method according to claim 34, wherein said network is comprised in a brain.

38. A method according to claim 37, wherein said controller replaces at least one natural learning related function of said brain.

39. A method according to claim 37, wherein said output is measured on said brain.

40. A method according to claim 37, wherein said output is measured as a response of said human.

41. A method according to claim 37, wherein said input is provided directly to said brain.

42. A method according to claim 37, wherein said stimulation is provided directly to said brain.

43. A method according to claim 37, wherein said stimulation is provided to said brain via natural senses.

44. A method according to claim 37, wherein said input is provided to said brain via natural senses.

45. A method according to claim 37, wherein modifying said stimulation comprising controlling the propagation of a signal inside said brain.

46. A method according to claim 37, wherein said method is used to rehabilitate an old function of said network.

47. A method according to claim 37, wherein said method is used to teach a new function to said network.

48. A method according to claim 37, wherein said method is used to teach new motor programs to said network.

49. A method according to claim 37, wherein said method is used to create a new pathway in said brain.

50. A method according to claim 37, wherein said method is used to create a new function area in said brain.

51. A method according to claim 37, wherein said method is used to remap a function from one brain area to another in said brain.

52. A method according to claim 37, wherein said method is used to erase a learned pattern from said brain.

53. A method according to claim 37, wherein said method is used to create a digital logic functioning area in said brain.

54. A method according to claim 37, wherein said method is used to train the brain in the use of an artificial organ.

55. A method according to claim 54, wherein said organ is a replacement organ.

56. A method according to claim 54, wherein said organ is a new organ not corresponding to a previous organ controlled by said brain.

57. A method according to claim 37, wherein said human is not conscious during the application of said method.

58. A method according to claim 37, wherein said human is not in control of learning processes imposed by said method.

59. A method according to claim 37, comprising not motivating said human in response to the output.

60. A method according to claim 37, wherein said human reports said output.

61. A method according to claim 37, wherein said human generates said input.

62. A method according to claim 37, comprising performing actions by said human to capture previously trained un-associated input-output response patterns.

63. A method according to claim 37, wherein said input is an input internal to said brain.

64. A method according to claim 37, wherein said output is an output internal to said brain.

65. A method according to claim 37, wherein said output comprises controlling an epilepsy attack.

66. A method according to claim 37, wherein said output comprises reducing a sensation of pain.

67. An animal trained according to the method of claim 29.

68. Apparatus for training an in-vivo neural network, comprising:
an input stimulator that generates an input stimulation to said network;
a detector that detects at least an indication of a response of said network; and
a controller that selectively controls said input stimulator such that if a desired output is detected, said input stimulation is changed.

69. Apparatus according to claim 68, wherein at least one of said simulator and said detector is implanted in vivo.

70. Apparatus according to claim 68, wherein said apparatus is external to a body on which it is used.

71. Apparatus according to claim 68, wherein said apparatus is mobile with a body on which it is used.

72. Apparatus according to claim 68, comprising an optional general stimulator that is operative to stimulate an area of the network larger than that used for receiving said input stimulation.

73. Apparatus according to claim 68, wherein said general stimulator comprises a TMS (trans-carnial magnetic stimulator).

74. Apparatus according to claim 68, wherein said detector detects a signal generated in said network.

75. Apparatus according to claim 68, wherein said detector detects a signal off of an object controlled by said network.

76. Apparatus according to claim 68, wherein said detector comprises an EMG sensor.

77. Apparatus according to claim 68, wherein said detector comprises an EEG sensor.

78. Apparatus according to claim 68, wherein said detector comprises an neural electrode.

79. Apparatus according to claim 68, wherein said stimulator directly stimulates said network via neural tissue which is trained by said apparatus.

80. Apparatus according to claim 68, wherein said stimulator indirectly stimulates said network through neural tissue which is not trained by said apparatus.

81. Apparatus according to claim 68, wherein said controller is programmed to training said network in a particular manner.

82. Apparatus according to claim 68, wherein said controller is programmed to maintain a training of said network.

83. Apparatus for interfacing with an in-vivo neural network, that has been trained to include an unnatural input or output area in which a signal generated by the network is more easily detected or a signal input to the network will interact with similar functioning and inter-related neurons, comprising:

at least one of an neuronal input and a neuronal output;

a payload apparatus to be interfaced with said network; and

a controller that interfaces said payload and said network, by translating a signal from said trained area or to said area as being directed to said trained input or output.

84. Apparatus according to claim 83, wherein said apparatus comprises a neuronal input.

85. Apparatus according to claim 84, wherein said input comprises a spatially discrete input.

86. Apparatus according to claim 83, wherein said apparatus comprises a neuronal output.

87. Apparatus according to claim 86, wherein said output comprises a spatially discrete output .

88. Apparatus according to claim 83, wherein said apparatus comprises both a neuronal input and a neuronal output.

89. Apparatus according to claim 88, wherein said payload generates an input signal for said network.

90. Apparatus according to claim 88, wherein said payload receives an output signal from said network.

91. Apparatus according to claim 88, wherein said payload comprises an artificial organ.

92. Apparatus according to claim 88, wherein said payload comprises circuitry that performs a function for said network based on an input from said network and provides an output to said network.

93. Apparatus according to claim 88, wherein said payload comprises at least one of a localization device, a communication device and a general purpose computer.

94. Apparatus according to claim 88, wherein said payload comprises circuitry that detects a condition in said network and generates a signal to said network such that a response of said network to said signal will have a desired effect responsive to said condition.

95. Apparatus according to claim 94, wherein said condition is an epilepsy attack and wherein said response is prevention of a propagation of said attack.

96. Apparatus according to claim 88, wherein said payload comprises circuitry that uses said network to perform a function based on an input from said circuitry and reading an output from said network.

97. Apparatus according to claim 83, wherein said apparatus is implantable.

98. Apparatus according to claim 83, wherein said apparatus is wearable.

99. Apparatus according to claim 83, wherein said apparatus trains said network to have said input or said output area.

100. A method of assaying a drug for psycho-active effects, comprising:

training a neural network under a first condition of the drug and measuring at least one parameter related to the training;

training the neural network under a second condition of the drug and measuring said at least one parameter; and

comparing the measurements.

101. A method according to claim 100, wherein said training comprises training by stimulus removal.

102. A method according to claim 100, wherein said neural network is an in-vivo network.

103. A method according to claim 100, wherein said neural network is an in-vitro network.